EOS Mission Support Network Performance Report

This is a monthly summary of EMSnet performance testing -- comparing the measured performance against the requirements. Currently using updated BAH requirements (Feb '03), including missions through 2006.

All results are reported on the web site: http://netstats.eos.nasa.gov/performance/Net_Health/EMSnet_list.html. It shows MRTG-like graphs of the performance to various test sites, including thruput, RTT, packet loss, and hops, with 1 week, 2 month and 6 month graphs.

Check out the new ENSIGHT web site, mostly working, but still under development: http://ensight.eos.nasa.gov/Networks/emsnet/index.html

Highlights:

- Most test results were stable.
- The requirements used as the basis for the ratings were updated to the FY '04 values. While most requirements changes were small, there was a large increase in the LaRC → GSFC requirement, due to the LaRC backhaul requirement kicking in. This reduced the LaRC → GSFC rating from Excellent to Adequate.
- Outflow from GSFC DAAC was stable to lower this month, and the GSFC ECS firewall was upgraded with additional memory, improving GSFC outflow iperf measurements, and decreasing the error rates.
- Rating for US →NASDA remains low due to the inclusion of 4 ISTs for AMSR-E into the requirement. Note: this is possibly an excessive requirement.

Ratings:

Rating Categories:

Excellent: **Total Kbps** > Requirement * 3
Good: 1.3 * Requirement <= **Total Kbps** < Requirement * 3
Adequate: Requirement < **Total Kbps** < Requirement * 1.3
Low: **Total Kbps** < Requirement.
Bad: **Total Kbps** < Requirement / 3

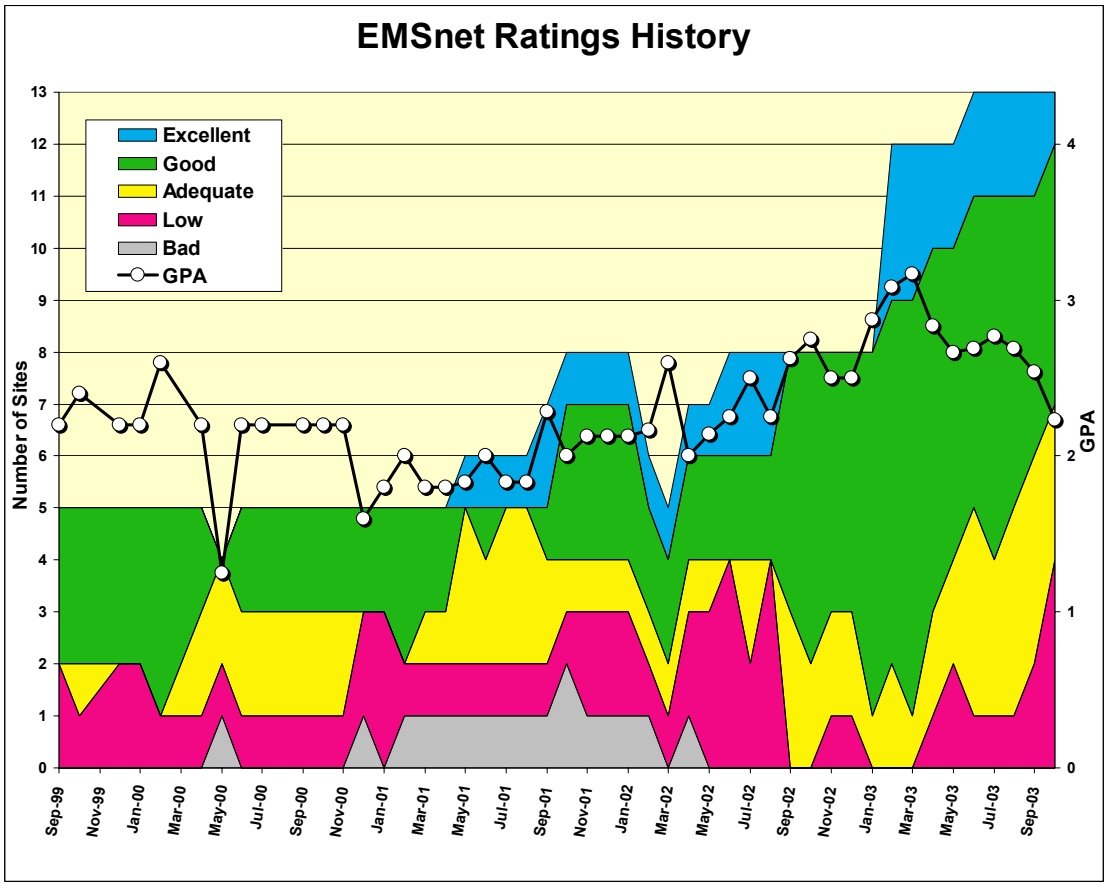
Where Total Kbps = User Flow + iperf monthly average

Upgrades: ↑ **None**

Downgrades: ↓

LaRC → GSFC: Excellent → **Adequate**
GSFC → EDC: Adequate → **Low**
GSFC → LaRC: Adequate → **Low**

The chart below shows the number of sites in each classification since EMSnet testing started in September 1999. Note that these ratings do NOT relate to absolute performance -- they are relative to the EOS requirements. The GPA is calculated based on Excellent: 4, Good: 3, Adequate: 2, Low: 1, Bad: 0



EMSnet Sites
Network Requirements vs. Measured Performance

October 2003		Requirements (kbps)		Testing						
Source → Destination	Team (s)	Current Oct-03	Future Apr-04	Source → Dest Nodes	Avg User Flow kbps	Perf Avg kbps	Total Avg kbps	Current Status re Oct-03	Prev Stat	Current Status re Apr-04
ASF --> NOAA	ADEOS II	1864	1864	ASF → NESDIS	433	2297	2729	GOOD	G	GOOD
GSFC --> EDC	MODIS, LandSat	216574	285324	GSFC-DOORS → EDCTest	132815	65409	198224	LOW	A	LOW
GSFC --> ERSDAC	ASTER	664	664	GDAAC → ERSDAC	71	783	854	Adequate	A	Adequate
GSFC --> JPL	ASTER, QuikScat, MLS, etc.	1300	1296	CSAFS → JPL-SEAPAC	1292	4419	5711	Excellent	E	Excellent
JPL --> GSFC	ADEOS II, AMSR, etc.	4693	4691	JPL-PODAAC → GDAAC	474	8507	8981	GOOD	G	GOOD
LaRC --> JPL	TES, MISR	49069	49069	LDAAC → JPL-TES	5915	37240	43155	LOW	L	LOW
GSFC --> LaRC	CERES, MISR, MOPITT	52664	59659	GDAAC → LDAAC	13112	33922	47034	LOW	A	LOW
LaRC --> GSFC	MODIS, TES	44795	44851	LDAAC → GDAAC	357	45455	45812	Adequate	E	Adequate
US --> NASDA	QuikScat, TRMM, AMSR	2623	2623	GSFC-CSAFS → NASDA	537	1808	2345	LOW	L	LOW
NASDA --> US	AMSR, ADEOS II	1559	1559	NASDA → JPL-SEAPAC	169	2299	2468	GOOD	G	GOOD
JPL --> NSIDC	AMSR	1540	2311	JPL-PODAAC → NSIDC SIDADS	437	4083	4520	GOOD	G	GOOD
NSIDC --> GSFC	MODIS, ICESAT, QuikScat	8313	8313	NSIDC DAAC → GDAAC	171	14377	14548	GOOD	G	GOOD
GSFC --> NSIDC	MODIS, ICESAT, QuikScat	38234	56994	GDAAC → NSIDC DAAC	7168	34823	41991	Adequate	A	LOW

Notes: Flow Requirements (from BAH) include TRMM, Terra , Aqua, QuikScat, ADEOS II

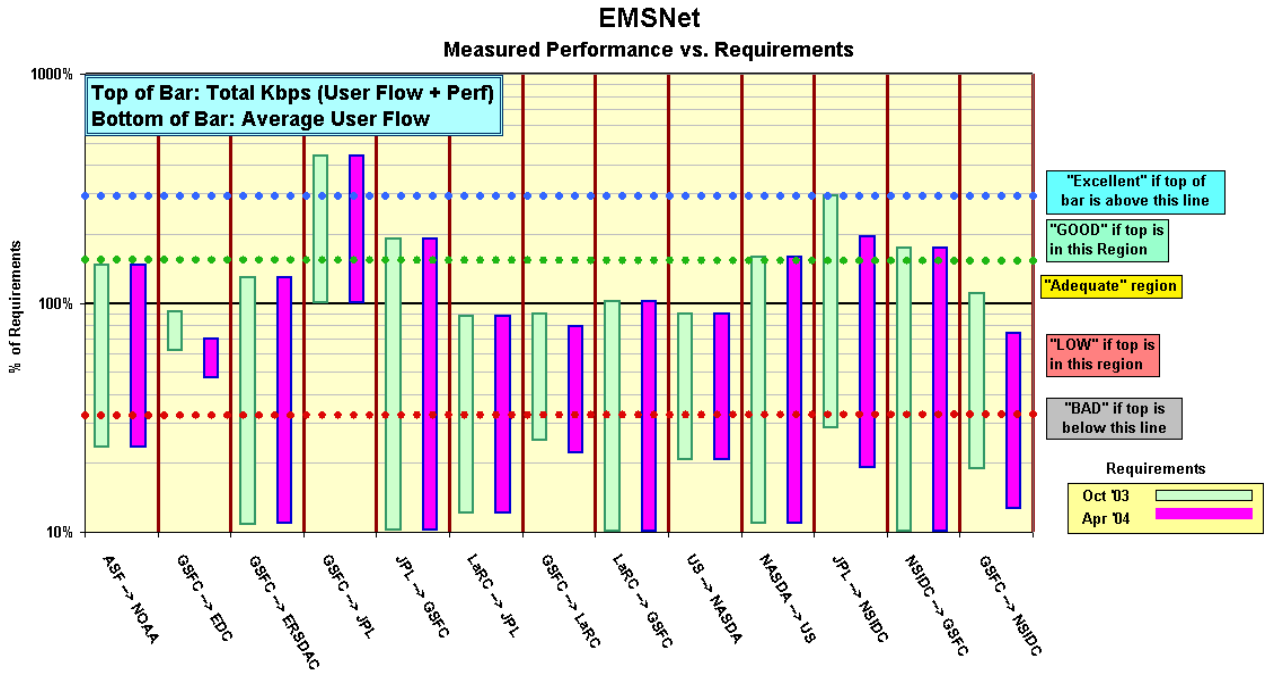
*Criteria:		
	Excellent	**Total Kbps** > Requirement * 3
	GOOD	1.3 * Requirement <= **Total Kbps** < Requirement * 3
	Adequate	Requirement < **Total Kbps** < Requirement * 1.3
	LOW	**Total Kbps** < Requirement
	BAD	**Total Kbps** < Requirement / 3

Change History:		
	27-Sep-99	Original - TRMM, Terra, and QuikScat
	19-Jan-01	Incorporated BAH requirements including additional missions
	9-Apr-01	Updated BAH requirements
	4-Jun-01	Added 50% contingency to BAH requirements
	16-Nov-01	Added MRTG to Iperf, updated requirements, Revised criteria
	2-Oct-02	Updated to revised BAH requirements
	7-Mar-03	Updated Requirements, Added tests to GSFC, improved User flow calculation

Ratings Summary	Oct-03 Score	Reg Prev	Apr-04 Score
Excellent	1	2	1
GOOD	5	5	5
Adequate	3	4	2
LOW	4	2	5
BAD	0	0	0
Total	13	13	13
GPA	2.23	2.54	2.15

Comparison of measured performance with Requirements:

This graph shows two bars for each source-destination pair. Each bar uses the same actual measured performance, but compares it to the requirements for two different times (June '03, and Oct. '03). Thus as the requirements increase, the same measured performance will be lower in comparison.



Note: this chart shows that the performance to most sites is remarkably close to requirements. In the past, some sites have had performance way above the requirements, others way below.

Also note that the interpretation of these bars has changed since Sept '01. The bottom of each bar is the average measured MRTG flow to that site (previously daily minimum). Thus the bottom of each bar can be used to assess the relationship between the requirements and actual flows. Note that the requirements include a 50% contingency factor above what was specified by the projects, so a value of 66% would indicate that the project is flowing as much data as requested.

Details on individual sites:

1) ASF ←→ CONUS:

Rating: Continued **Good**

Web Page: http://corn.eos.nasa.gov/performance/Net_Health/files/ASF-EMS.html

Test Results:

Source → Dest	Medians of daily tests (mbps)				
	Best	Median	Worst	User Flow	TOTAL
ASF → NESDIS	2.37	2.30	0.47	0.43	2.73
ASF → GSFC-CSAFS	2.60	2.37	0.54		
ASF→ JPL-SEAPAC	2.79	2.60	0.96		
GSFC-CSAFS → ASF	2.75	2.59	0.89	.047	2.64

Requirements:

Source → Dest	FY	Mbps	Rating
ASF → NESDIS	'03, '04	1.86	Good

Comments: The 2.7 mbps total from ASF → NOAA is very good for a 2 * T1 (3.1 mbps) circuit. Since this is more than 30% over the October '03 requirement, the rating remains "Good".

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2) GSFC → EDC:

Rating: ↓ Adequate → **Low**

Web Page: http://corn.eos.nasa.gov/performance/Net_Health/files/EDC.html

Test Results:

Source → Dest	Medians of daily tests (mbps)				
	Best	Median	Worst	User Flow	TOTAL
DOORS → EDC Test	225.6	65.4	38.8	132.8	198.2
DOORS → EDC DAAC	175.7	77.3	29.7		
G-DAAC→ EDC DAAC	65.2	30.3	12.9		

Requirements:

Date	mbps	Rating
Oct '03	216.6	Low

Comments: The three test cases above continue to show the effects of the DAAC firewalls: the test shown on the top row has no firewalls in the path, just vBNS+. The next test goes through the EDC firewall to the ECS DAAC, and the last test goes through both the GSFC and EDC firewalls. From these values, it does not appear that the EDC firewall has very much of an effect on thruput, but the GSFC firewall does. Note that the GDAAC has been sending out 150-200 mbps most of the time for the past month, much of it (133 mbps) to EDC.

This month the user flow decreased about 55 mbps, and the corresponding thruput tests increased, but by only 7 mbps, for a total decrease in the total of about 47 mbps. The combined user flow + thruput dropped below the Oct '03 requirement, so the rating drops to "Low".

3) JPL:

Ratings: GSFC → JPL: Continued **Excellent**
JPL → GSFC: Continued **Good**
LaRC → JPL: Continued **Low**

Web Pages:

http://corn.eos.nasa.gov/performance/Net_Health/files/JPL-SEAPAC.html
http://corn.eos.nasa.gov/performance/Net_Health/files/JPL-PODAAC.html
http://corn.eos.nasa.gov/performance/Net_Health/files/JPL-TES.html
http://corn.eos.nasa.gov/performance/Net_Health/files/JPL-MISR.html

Test Results:

Source → Dest	Medians of daily tests (mbps)				
	Best	Median	Worst	User Flow	TOTAL
GSFC-CSAFS → JPL-SEAPAC	5.96	4.42	1.75	1.29	5.71
LaRC DAAC → JPL-TES	40.40	37.24	19.59	5.91	43.16
LaRC DAAC → JPL-MISR	39.13	38.49	18.35		
JPL-PODAAC→ GSFC DAAC	11.44	8.51	3.13	0.47	8.98

Requirements:

Source → Dest	Date	mbps	Rating
GSFC → JPL combined	Oct '03	1.30	Excellent
JPL → GSFC combined	Oct '03	4.69	Good
LaRC DAAC → JPL-TES	Oct '03	30.6	
LaRC DAAC → JPL-MISR	Oct '03	18.5	
LaRC DAAC → JPL-Combined	Oct '03	49.1	Low

Comments:

GSFC → JPL: Performance on this circuit has been mostly stable since the BOP switchover on 15 August '02. However, on 16 June 2003, performance from MTVS1 to JPL PODAAC, and from G-DAAC to JPL-TES dropped and became noisier. (For example, from MTVS1 to PODAAC, the median dropped from 5.8 mbps to 2.8). However, the GSFC-CSAFS → JPL-SEAPAC results above (still stable) shows that the problem is not in EMSnet. This month the user flow increased from 0.8 mbps last month, but the iperf dropped from 5.67 for a slight drop overall.

LDAAC→ JPL: Performance from LDAAC to JPL-TES has been very stable since June 23. '03, when the PVC was set to the current value of 45 mbps. The combined MRTG and iperf values total very close to this value, indicating that the circuit is working to its specifications.

The route from LDAAC to the JPL-MISR SCF was switched to EMSnet in July. The performance for LDAAC to JPL-MISR via EMSnet shown above is, as expected, very similar to the performance to TES.

However, when the 18.5 mbps MISR requirement is added to the 30.6 mbps TES requirement, the 49 mbps total requirement is higher than the measured performance, and also higher than the nominal circuit speed. Thus the rating remains "Low".

This configuration is based on a management decision to set the circuit capacity at this level to reduce cost; in the expectation that both projects' requirements are bursty and include contingency. Thus the actual requirements of both projects are expected to be met with this circuit capacity.

JPL → GSFC: The requirement from JPL to GSFC includes flows from NASDA and ASF which go via JPL, and includes GSFC and NOAA destinations. The combined Dec. '02 requirement is 4.86 mbps, and the combined 9 mbps thruput is more than 30% above that, so the rating remains "Good".

4) NSIDC:

Ratings: GSFC → NSIDC: Continued **Adequate**
NSIDC → GSFC: Continued **Good**

Web Page: http://corn.eos.nasa.gov/performance/Net_Health/files/NSIDC-EMS.html

GSFC ←→ NSIDC Test Results:

Source → Dest	Medians of daily tests (mbps)				
	Best	Median	Worst	User Flow	TOTAL
GSFC-DAAC → NSIDC	81.00	34.82	15.63	7.17	42.0
NSIDC → GSFC-DAAC	16.54	14.38	6.73	0.17	14.6

Requirements:

Source → Dest	Date	mbps	Rating
GSFC → NSIDC	Oct '03	38.2	Adequate
NSIDC → GSFC	'03, '04	8.3	Good

Comments:

Performance from GSFC to NSIDC and from NSIDC to GSFC remains generally steady. However, the GSFC outflow congestion affects the median and worst measurements to NSIDC (peaks were stable), keeping the ratings for both FY '03 and '04 "Adequate".

Other Testing:

Source → Dest	Medians of daily tests (mbps)				
	Best	Median	Worst	Requirement	Rating
JPL → NSIDC-SIDADS	5.47	4.08	2.85	1.54	Good
GSFC-ISIPS → NSIDC	7.33	6.67	5.88		
LDAAC → NSIDC	4.92	4.70	3.66	0.07	Excellent

Comments:

JPL → NSIDC-SIDADS: Performance has been very steady from JPL since the Aug '02 BOP switchover, exceeding the modest requirement.

GSFC-ISIPS → NSIDC: Testing is ftp pulls by NSIDC from ISIPS. Performance is very steady at 7 mbps, apparently limited by ftp window size. Manual testing using iperf between the same machines in the same direction gets over 20 mbps.

LDAAC → NSIDC: Thruput from LDAAC to NSIDC has been steady since August. The very low requirement produces a rating of "Excellent".

5) GSFC ←→ LaRC:

Ratings: GDAAC → LDAAC: ↓ Adequate → Low
LDAAC → GDAAC: ↓ Excellent → Adequate

Web Page: http://corn.eos.nasa.gov/performance/Net_Health/files/LARC.html

Test Results:

Source → Dest	Medians of daily tests (mbps)				
	Best	Median	Worst	User Flow	TOTAL
GDAAC → LDAAC	54.90	33.92	15.31	13.11	47.03
LDAAC → GDAAC	51.05	45.46	21.71	0.36	45.82

Requirements:

Source → Dest	Date	Mbps	Rating
GDAAC → LDAAC	Oct '03	52.7	Low
LDAAC → GDAAC	June '03	6.8	Excellent
LDAAC → GDAAC	Oct '03	44.8	Adequate

Comments: Iperf performance from GSFC was generally stable, with the large GSFC outflow reducing the total a bit. However, the user flow dropped from 23.5 mbps last month, reducing the combined thruput below the Oct. '03 requirement, so the rating drops to "Low".

The LaRC → GSFC performance remains stable. But the FY '04 requirement jumps, based on the planned backhaul of all LaRC science outflow via GSFC. The circuit was upgraded to meet this requirement on 18 June -- median thruput was 24 mbps prior to that. The thruput is slightly above this new requirement, so the Oct '03 rating drops to "Adequate" (would have been "Excellent" based on June '03 requirement).

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6) GSFC → ERSDAC:

Rating: Continued Adequate

Web Page: http://corn.eos.nasa.gov/performance/Net_Health/files/ERSDAC.html

Test Results:

Source → Dest	Medians of daily tests (kbps)				
	Best	Median	Worst	User Flow	TOTAL
GSFC → ERSDAC	800	783	473	71	854

Requirements:

Source → Dest	FY	Kbps	Rating
GSFC → ERSDAC	'03, '04	664	Adequate

Comments: Thruput since June '02, using the 1 mbps ATM connection had been very stable (except for a problem period from 12 November '02 to 3 Jan '03). The total user flow plus iperf is a bit below 30 % over the requirement, so the rating remains "Adequate".

7A) US → NASDA:

Rating: Continued **Low**

Web Page: http://corn.eos.nasa.gov/performance/Net_Health/files/NASDA-EMSnet.html

Test Results:

Source → Dest	Medians of daily tests (mbps)				
	Best	Median	Worst	User Flow	TOTAL
GSFC-CSAFS → NASDA-EOC	2.15	1.81	1.02	0.54	2.34
ASF → NASDA-EOC	2.14	1.90	1.02		

Requirements

Source → Dest	FY	mbps	Rating
GSFC → NASDA	Oct '03	2.62	Low

Comments: Performance steady -- about as expected for the 3 mbps ATM PVC (using multiple TCP streams to mitigate the TCP window size limitation at NASDA). Results from ASF to NASDA were about the same as from CSAFS. The requirements above include 4 ISTs at NASDA for AMSR-E. Each IST has a requirement for 311 kbps, for a total of 1244 kbps. This requirement causes the rating to be "Low", even though the performance was stable. It could be questioned whether NASDA intends to operate all four of the ISTs simultaneously, or whether some ISTs are backups, in which case the network requirements would be reduced to a value attainable with the current circuit.

7B) NASDA → US:

Rating: Continued **Good**

Web Pages: http://corn.eos.nasa.gov/performance/Net_Health/files/JPL-SEAPAC.html
http://corn.eos.nasa.gov/performance/Net_Health/files/GSFC-SAFS.html

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NASDA-EOC          JPL_SEAPAC      2242          2220.75          821
NASDA-EOC          GDAAC_EMS       1534          1362.75          428
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Test Results:

Source → Dest	Medians of daily tests (mbps)				
	Best	Median	Worst	User Flow	TOTAL
NASDA-EOC → JPL-SEAPAC	2.32	2.30	0.74	0.17	2.47
NASDA-EOC → GSFC-CSAFS	1.43	1.39	0.53		

Requirements:

Source → Dest	FY	mbps	Rating
NASDA → US	'02, '03	1.56	Good

Comments: Performance continues stable on the new circuit. The rating remains "Good".

Note: NASDA has not yet implemented testing with multiple tcp streams. So performance to GSFC is limited by the TCP window size on NASDA's test machine, in conjunction with the long RTT. Therefore, in order to reflect the actual capability of network, the rating is derived from testing from NASDA to JPL. This test uses the same Trans-Pacific circuit, but has a shorter RTT, so will not be as severely limited by the TCP window size. The Trans-Pacific circuit connects into the higher speed domestic EMSnet at JPL, which is not expected to be the limiting factor.